

PATENT ABSTRACTS OF JAPAN

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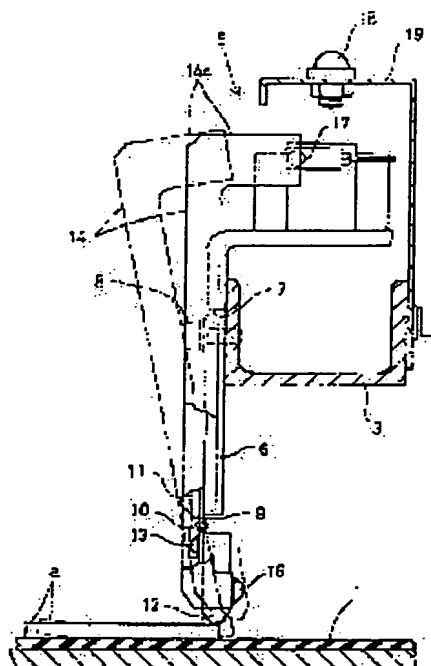
YOSHIDA KAZUHIRO

(54) AUTOMATIC INSPECTING APPARATUS FOR CERAMIC TILE

(57)Abstract:

PROBLEM TO BE SOLVED: To detect a small warp, etc., by arranging a plurality of contact elements having leading ends of a predetermined height from the upper face of a conveyor so as to traverse a conveyor transferring a plurality of aligned ceramic tiles, and setting a detecting element which works when the contact elements are brought in touch with and pushed against the ceramic tiles.

SOLUTION: A horizontal rod 3 is moved up and down by turning a handle, thereby moving all inspection units 5 up and down. A bolt 8 is loosened to move a mounting body 6 up and down, so that the inspection units 5 are individually moved up and down. A distance between a leading end of each contact element 12 and an upper face of a belt conveyor 1 is adjusted to be slightly larger than a thickness of a normal ceramic tile (a). The normal ceramic tile (a) passes without touching the contact element 12 as indicated by a solid line. On the other hand, when the warping ceramic tile (a) is transferred, the contact element 12 is pressed and oscillated, and a lever 14 is also oscillated together. A shielding part 14a is separated from a proximity sensor 17, whereby a detection signal is outputted. The belt conveyor 1 is stopped and at the same time a lamp 18 is turned on.



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CLAIMS

[Claim(s)]

[Claim 1] The automatic test equipment of a ceramic tile which prepared the detection child who operates by contacting and pushing this contact on a ceramic tile while a head installs much contact of predetermined height from the top face of this conveyor so that this conveyor may be crossed [above the conveyor which aligns and conveys many ceramic tiles].

[Claim 2] The automatic test equipment of the ceramic tile according to claim 1 characterized by making said detection child operate with the splash of the part which the lever which makes said contact or this contact, and one was supported by splash freedom under the body of test equipment, and was extended from the supporting point of this lever.

[Claim 3] The automatic test equipment of the ceramic tile according to claim 1 or 2 with which a lower part is the amount of Oshige from the upper part, and is characterized by forming the stopper which prevents that said contact rocks behind [transit direction] said conveyor from said supporting point of the lever which makes said contact or this contact, and one.

[Claim 4] The automatic test equipment of the ceramic tile according to claim 1, 2, or 3 which the lamp in which it is shown which detection child said conveyor stopped by said detection child's actuation, and operated turns on.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This design is related with the equipment which detects automatically adhesion of the foreign matter to the curvature and front face of a ceramic tile. [finishing / baking]

[0002]

[Description of the Prior Art] Since defectives, such as a chip, a crack, deformation, discoloration, and adhesion of a foreign matter, may be mixed in the ceramic tile [finishing / baking], the inspection process which inspects the ceramic tile which aligns on the conveyor before packing and is conveyed by viewing of an operator is prepared.

[0003]

[Problem(s) to be Solved by the Invention] However, in inspection by viewing, it was easy to overlook adhesion of small curvature and a foreign matter, and it had the technical problem that a defective may be mixed and shipped into a product.

[0004]

[Means for Solving the Problem and its Function and Effect] So that invention of claim 1 may cross the conveyor as such The means for solving a technical problem [above the conveyor which aligns and conveys many ceramic tiles] Since the detection child who operates by contacting and pushing the contact on a ceramic tile was prepared while the head installed much contact of predetermined height from the top face of the conveyor Adhesion of the small curvature and foreign matter which tend to be overlooked visually is detectable. The lever on which invention of claim 2 makes contact, or its contact and one is supported by splash freedom under the body of test equipment. If contact is pushed a little when contact contacts the ceramic tile to which curvature and a foreign matter adhered since the detection child was made to operate with the splash of the part extended from the supporting point of the lever The part extended from the supporting point of a lever can rock greatly, and a detection child can be operated certainly. A lower part is the amount of Oshige from the upper part in the supporting point of a lever when invention of claim 3 makes contact, or its contact and one. And since the stopper which prevents that contact rocks behind [transit direction] said conveyor was formed It being maintained at the position by which contact was stabilized and producing malfunction is prevented, and said conveyor stops invention of claim 4 by a detection child's actuation. And since the lamp in which it is shown which detection child operated lights up, it is substitutable with the normal ceramic tile which found out the abnormal ceramic tile promptly and prepared it beforehand.

[0005]

[Embodiment of the Invention] Hereafter, the gestalt of 1 operation of this invention is explained based on an accompanying drawing.

[0006] In drawing 1, 1 is a band conveyor which conveys the ceramic tile a of a large number which aligned in the direction of an arrow head, the ceramic tile a with which Operator b flows is supervised, and the test equipment 2 concerning this invention is formed in the upstream.

[0007] This test equipment 2 attaches many inspection units 5 in the same pitch as the ceramic tile a carried in to the bar 3 which moves up and down by the revolution of a handle 4, as shown in drawing 2.

[0008] As each inspection unit 5 is shown in drawing 3 and 4, it is fixed to a bar 3 (body of test

equipment of this invention) with the bolt 8 which the mounting object 6 of an inverted-L character form let pass to the long hole 7. The upper part of a hinge 9 and the upper part of the stopper 10 of T typeface fasten a twist, are used as a screw 11, and are fixed to the soffit of this tie-down plate 6. In the lower part of a hinge 9, it is thick, and it is fixed on the screw 13, this contact 12 is maintained at a usual state by the vertical position in the lower part of a stopper 10 with the lower part of a hinge 9 with that self-weight, and contact 12 with large weight may have comes to rock only to the counterclockwise rotation of drawing 4 .

[0009] It is attached in the side face of contact 12 when the lever 14 of the inverted-L character form which consists of sheet metal fixes to the background of contact 12 the flection 15 formed in the soffit on a screw 16. In a usual state If contact 12 rocks as a continuous line shows to drawing 4 , the proximity sensor 17 which is the detection child by whom covered section 14a curved by the upper part of contact 12 was attached in the upper part of the mounting object 6 is approached and the chain line shows to this drawing, it will separate from a proximity sensor 17.

[0010] The gestalt of this operation becomes the above-mentioned configuration, and all the inspection units 5 are moved up and down by moving a bar 3 up and down by the revolution of a handle 4. By moving the inspection unit 5 up and down according to an individual by loosening a bolt 8 and moving the mounting object 6 up and down When spacing of the head of each contact 12 and the top face of a band conveyor 1 is adjusted so that it may become somewhat larger than the thickness of the normal ceramic tile a, the normal ceramic tile a To passing without contacting contact 12, as a continuous line shows to drawing 4 , as the chain line shows to this drawing If the ceramic tile a with curvature is conveyed, contact 12 will be pushed and it will rock. Rock in [a lever 14] one, covered section 14a separates from a proximity sensor 17, and a detection signal is emitted from a proximity sensor 17. Since the lamp 18 in which the proximity sensor 17 was attached by the wrap covering 19 lights up at the same time a band conveyor 1 stops, the ceramic tile a is removed, and it substitutes for the normal thing currently prepared beforehand, and operation of a band conveyor 1 is resumed.

[0011] This invention can detect the abnormalities of the thickness direction of the ceramic tiles a, such as adhesion on the front face of a foreign matter, in addition to the above-mentioned curvature.

[0012] Moreover, an optical sensor, a contact type sensor, etc. may be used for a detection child in addition to proximity-sensor 17.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the top view showing the outline of the gestalt of 1 operation of this invention.

[Drawing 2] It is the front view of the important section.

[Drawing 3] It is the amplification front view.

[Drawing 4] It is the side elevation.

[Description of Notations]

1: Band conveyor

3: Bar (body of test equipment)

9: Hinge

10: Stopper

12: Contact

14: Lever

17: Proximity sensor (detection child)

18: Lamp

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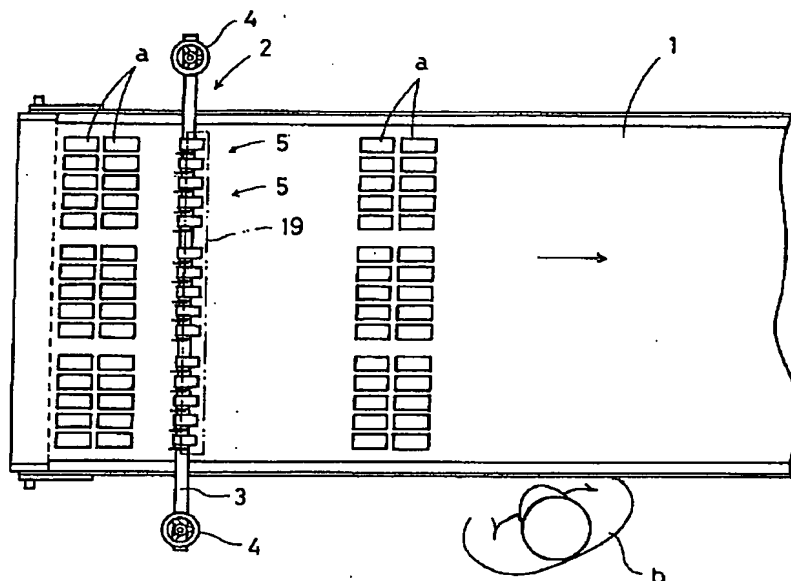
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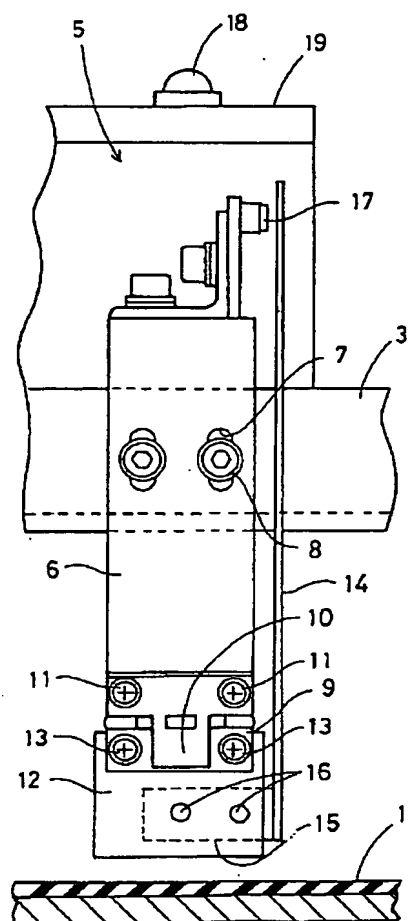
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DRAWINGS

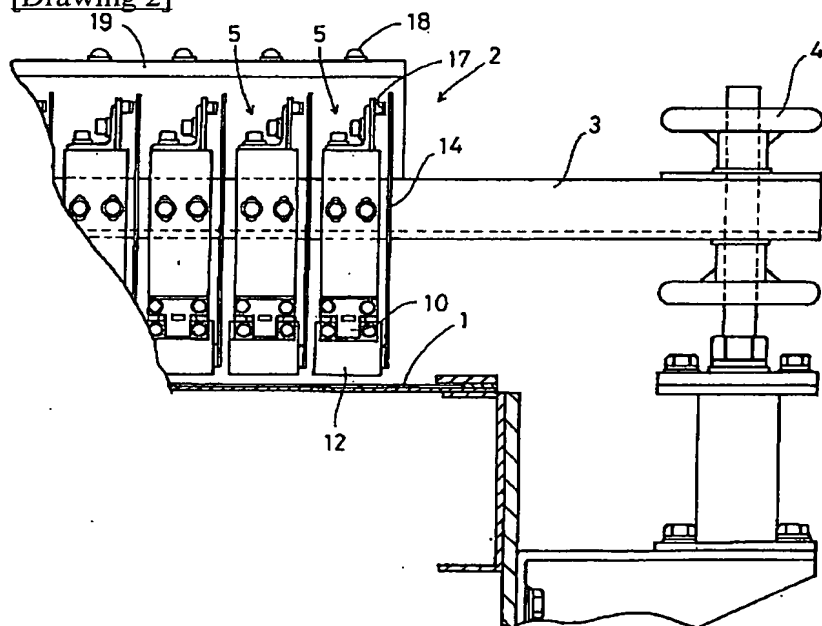
[Drawing 1]



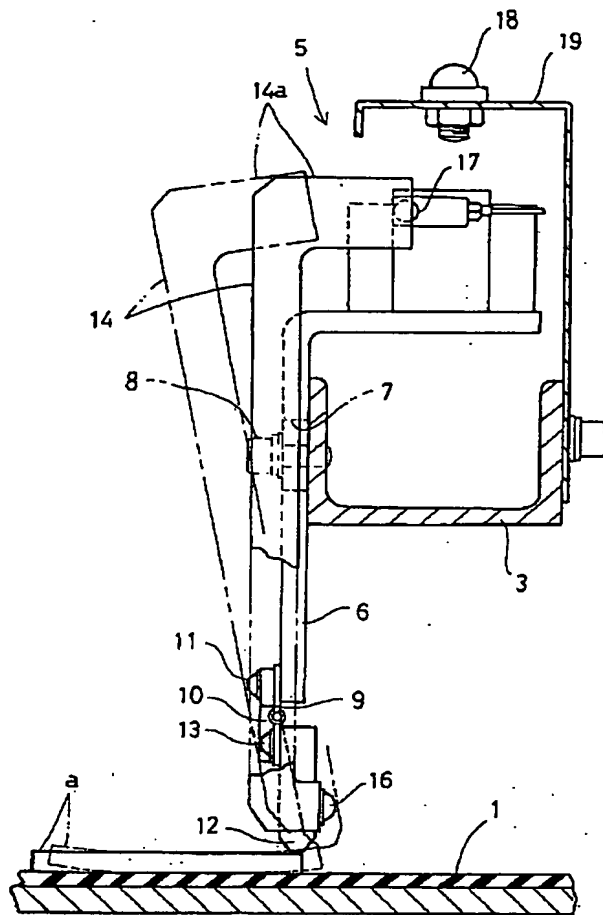
[Drawing 3]



[Drawing 2]



[Drawing 4]



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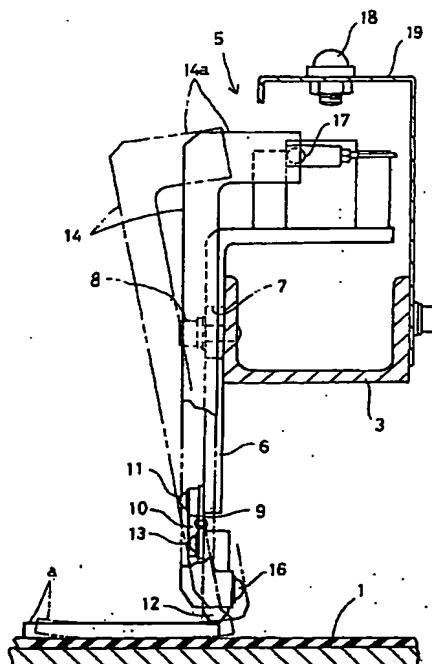
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(54) 【発明の名称】 陶磁製タイルの自動検査装置

(57) 【要約】

【課題】 従来の目視による検査では小さな反りや異物の付着は見落とし易く、不良品が製品中に混入して出荷される場合があるという課題があった。

【解決手段】 陶磁製タイルaを多数個整列して搬送するコンベア1の上方においてそのコンベア1を横切るように、先端がそのコンベア1の上面から所定高さの接触子12を多数個並設するとともにその接触子が陶磁製タイルに接触して押されることにより作動する検知子17を設けた。



【特許請求の範囲】

【請求項1】 陶磁製タイルを多数個整列して搬送するコンベアの上において該コンベアを横切るように、先端が該コンベアの上面から所定高さの接触子を多数個並設するとともに該接触子が陶磁製タイルに接触して押されることにより作動する検知子を設けた陶磁製タイルの自動検査装置。

【請求項2】 前記接触子または該接触子と一体をなすレバーが検査装置本体の下方に揺動自由に支持され、該レバーの支持点から延長した部分の揺動により前記検知子が作動するようにしたことを特徴とする請求項1記載の陶磁製タイルの自動検査装置。

【請求項3】 前記接触子または該接触子と一体をなすレバーの前記支持点より下方が上方より大重量であり、かつ、前記接触子が前記コンベアの走行方向後方に揺動するのを阻止するストッパを設けたことを特徴とする請求項1または2記載の陶磁製タイルの自動検査装置。

【請求項4】 前記検知子の作動により前記コンベアが停止し、かつ、どの検知子が作動したかを示すランプが点灯するようになっている請求項1、2または3記載の陶磁製タイルの自動検査装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本考案は、焼成済みの陶磁製タイルの反りや表面への異物の付着を自動的に検知する装置に関する。

【0002】

【従来の技術】 焼成済みの陶磁製タイルには欠け、ひび割れ、変形、変色や異物の付着などの不良品が混入していることがあるため、箱詰め前のコンベア上に整列して搬送される陶磁製タイルを作業者の目視により検査する検査工程が設けられている。

【0003】

【発明が解決しようとする課題】 しかしながら、目視による検査では小さな反りや異物の付着は見落とし易く、不良品が製品中に混入して出荷される場合があるという課題があった。

【0004】

【課題を解決するための手段、作用及び効果】 このような課題を解決するための手段として、請求項1の発明は陶磁製タイルを多数個整列して搬送するコンベアの上においてそのコンベアを横切るように、先端がそのコンベアの上面から所定高さの接触子を多数個並設するとともにその接触子が陶磁製タイルに接触して押されることにより作動する検知子を設けたから、目視では見落とされがちな小さな反りや異物の付着を検知することができ、請求項2の発明は接触子またはその接触子と一体をなすレバーが検査装置本体の下方に揺動自由に支持され、そのレバーの支持点から延長した部分の揺動により検知子が作動するようにしたから、接触子が反りや異物

の付着した陶磁製タイルに接触することにより接触子が少し押されると、レバーの支持点から延長した部分が大きく揺動して検知子を確実に作動させることができ、請求項3の発明は接触子またはその接触子と一体をなすレバーの支持点より下方が上方より大重量であり、かつ、接触子が前記コンベアの走行方向後方に揺動するのを阻止するストッパを設けたから、接触子が安定した姿勢に保たれて誤動作を生じるのが防止され、請求項4の発明は検知子の作動により前記コンベアが停止し、かつ、どの検知子が作動したかを示すランプが点灯するようになっているから、異常のある陶磁製タイルを直ちに発見してあらかじめ用意しておいた正常な陶磁製タイルと差し替えることができる。

【0005】

【発明の実施の形態】 以下、本発明の一実施の形態を添付図面に基いて説明する。

【0006】 図1において、1は整列された多数の陶磁製タイルaを矢印方向に搬送するベルトコンベアであって、作業員bが流れてくる陶磁製タイルaを監視しており、その上流側には本発明に係る検査装置2が設けられている。

【0007】 この検査装置2は、図2に示すように、ハンドル4の回転により上下動する横棒3に、搬入されて来る陶磁製タイルaと同一ピッチで多数の検査ユニット5を取り付けたものである。

【0008】 各検査ユニット5は、図3、4に示すように、逆L字形の取付体6が長孔7に通したボルト8により横棒3（本発明の検査装置本体）に固定され、この取付体6の下端に螺番9の上部とT字形のストッパ10の上部がビス11により共締めされて固定され、螺番9の下部には肉厚で重量の大きい接触子12がビス13により固定されていて常にはこの接触子12がその自重により螺番9の下部とともにストッパ10の下部に当たって垂直姿勢にたもたれ、図4の反時計方向にのみ揺動するようにになっている。

【0009】 接触子12の側面には、薄板からなる逆L字形のレバー14が下端に形成された屈曲部15をビス16で接触子12の裏側に固定することにより取り付けられていて、常には、図4に実線で示すように、接触子12の上部に曲成された遮蔽部14aが取付体6の上部に取り付けられた検知子である近接センサ17に接近し、同図に鎖線で示すように、接触子12が揺動すると近接センサ17から離れるようになっている。

【0010】 本実施の形態は上記構成になり、ハンドル4の回転により横棒3を上下動することによりすべての検査ユニット5を上下動し、ボルト8を緩めて取付体6を上下動することにより検査ユニット5を個別に上下動させることにより、各接触子12の先端とベルトコンベア1の上面との間隔を正常な陶磁製タイルaの厚さより少し大きくなるように調節しておく、正常な陶磁製タ

イルaは、図4に実線で示すように、接触子12に接触することなく通過するのに対し、同図に鎖線で示すように、反りのある陶磁製タイルaが搬送されてくると接触子12が押されて揺動し、レバー14も一体的に揺動して遮蔽部14aが近接センサ17から離れて近接センサ17から検知信号が発せられ、ベルトコンベア1が停止すると同時にその近接センサ17を覆うカバー19に取り付けられたランプ18が点灯するためその陶磁製タイルaを除去し、あらかじめ用意していた正常なものと差し替えてベルトコンベア1の運転を再開する。

【0011】本発明は、上記した反り以外に異物の表面への付着などの陶磁製タイルaの厚さ方向の異常を検知することができる。

【0012】また、検知子には近接センサ17以外に光学式センサや接触式センサなどを用いてもよい。 *

*【図面の簡単な説明】

【図1】本発明の一実施の形態の概要を示す平面図である。

【図2】その要部の正面図である。

【図3】その拡大正面図である。

【図4】その側面図である。

【符号の説明】

1：ベルトコンベア

3：横棒（検査装置本体）

9：螺番

10：ストッパ

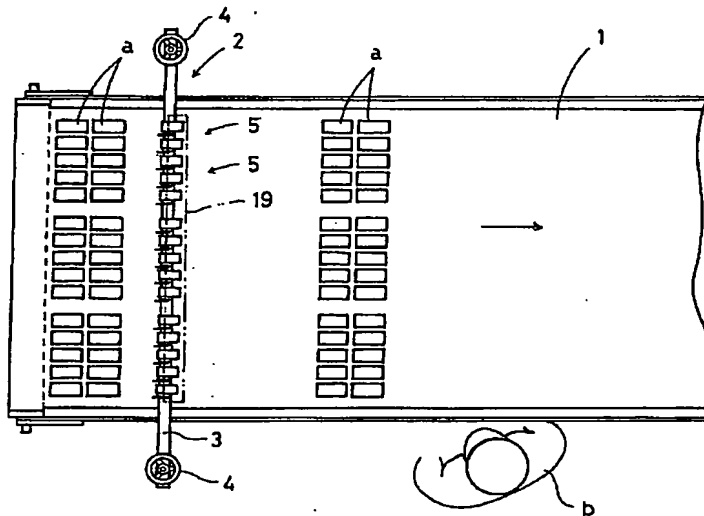
12：接触子

14：レバー

17：近接センサ（検知子）

18：ランプ

【図1】



【図3】

